

NAVAL POSTGRADUATE SCHOOL
Monterey, California

EC 3550/EO 3911

MIDTERM EXAM I

10/00 Prof. Powers

- This exam is closed book and notes; notes on two sides of 8-1/2 x 11 paper are allowed.
- There is a 50 minute time limit.
- There are four problems; each is equally weighted.
- Partial credit will be given; be sure to do some work on each problem.
- Be *sure* to include units in your answers.
- Please circle or underline your answers.
- Do *NOT* do any work on this sheet.
- Show *ALL* work.

1	
2	
3	
4	
Total	

Name: _____

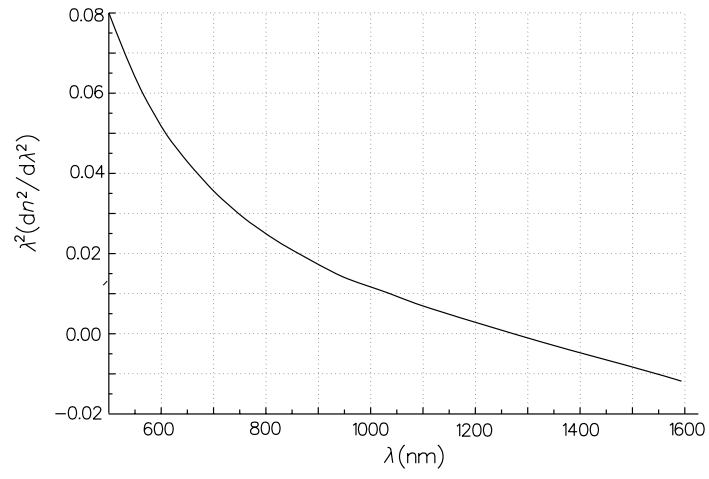


Figure 1: Fig. 3.8 of text

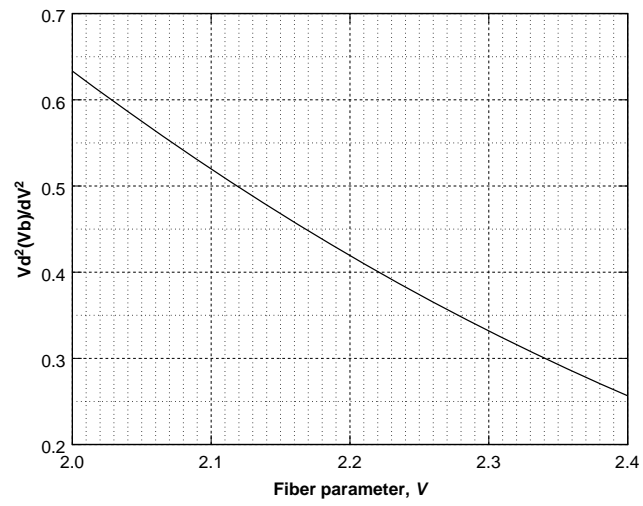


Figure 2: Fig. 3.10 of text

1. (a) What is the primary advantage of singlemode fiber over multimode fiber?
(b) Give one advantage of multimode fiber over singlemode fiber?
(c) What is the primary advantage of graded-index multimode fiber over step-index multimode fiber?
(d) An officer asserts that “copper coaxial links are always cheaper than fiber links.” What is your response?
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2. A fiber link is 48 km long. Only fiber loss is present in the link (i.e., the connectors and/or splices are ideal and have 0 dB loss). When 1 mW of power is inserted at the link input, 1.5 μ W are observed at the output.

The input power is now reduced to 100 μ W. Calculate the power in the fiber at the link midpoint (i.e., 24 km into the fiber link) *in dBm and μ W*. (Note: you must use the “dB method” in your calculation.)

The following information applies to questions 3 and 4. A manufacturer has produced an experimental, 9/125 singlemode fiber with the following properties: triangular index profile, $n_1 = 1.460$, and NA=0.12.

3. Calculate the cutoff wavelength for this fiber.
4. Calculate the maximum-bandwidth-distance product [*in units of (Gb/s)·km*] for this fiber when used with a 1601-nm source that has a linewidth of 0.5 nm.